TOSHIBA 22965850

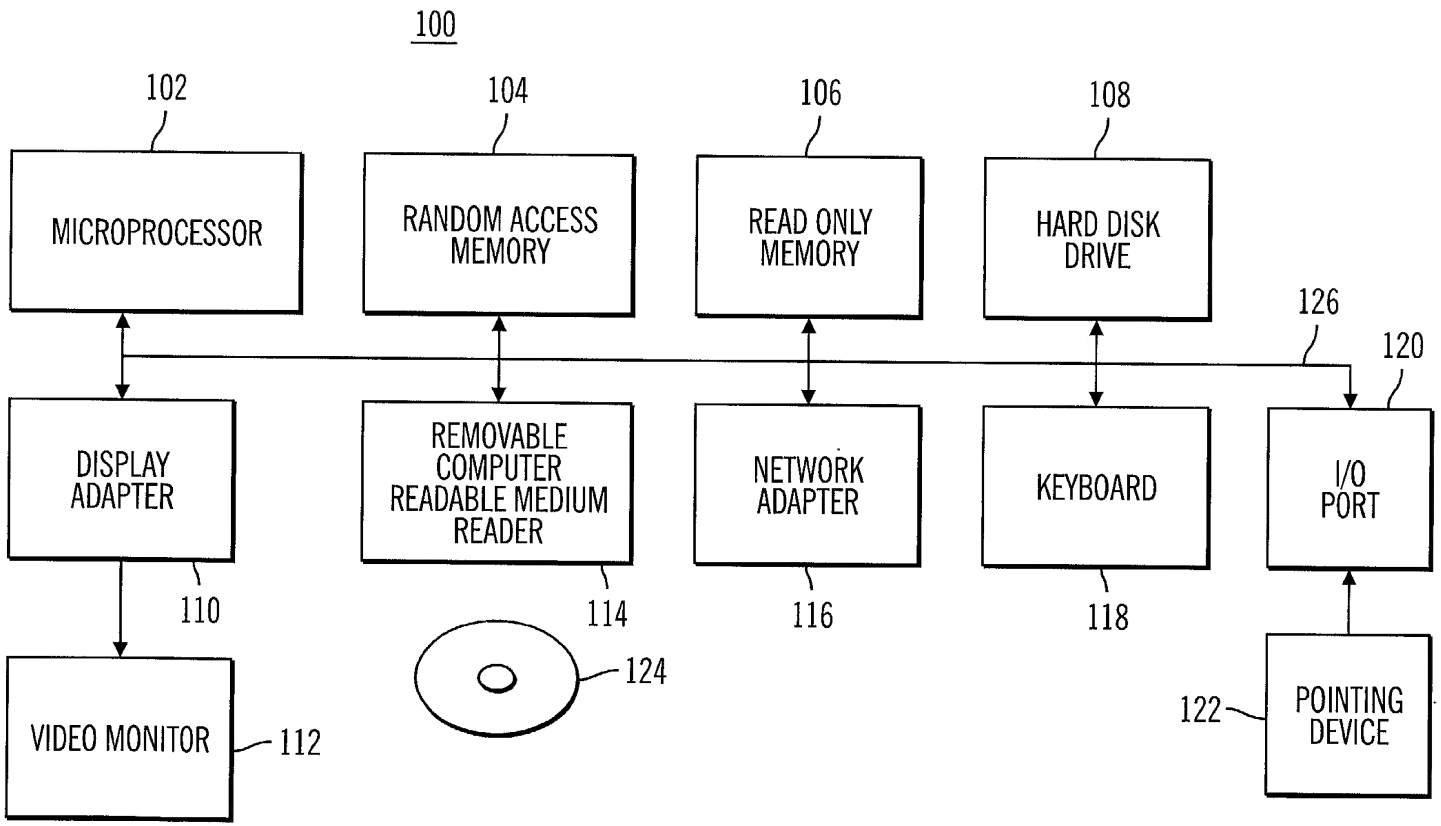



FIG. 1

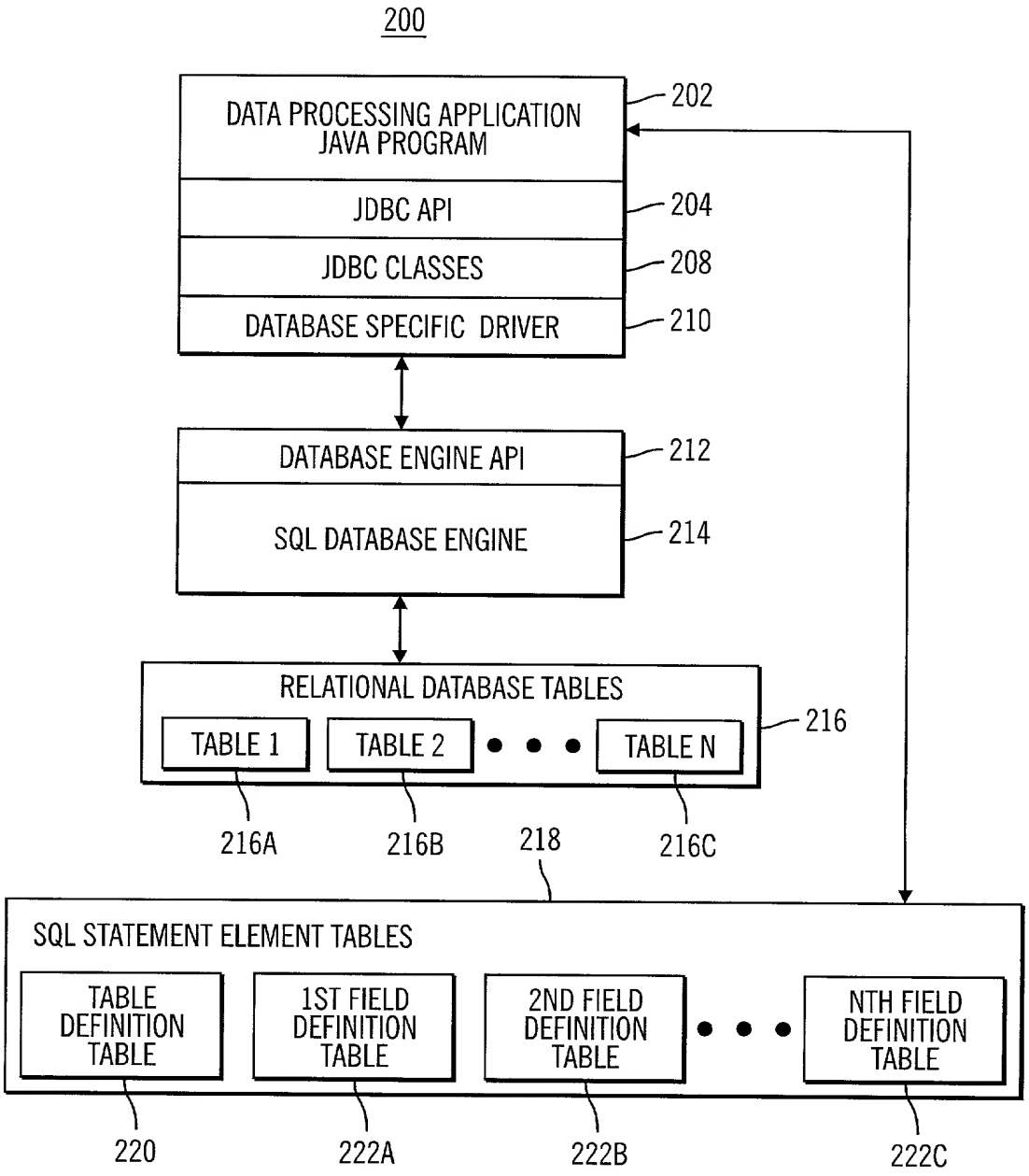

200
DATA PROCESSING APPLICATION
JAVA PROGRAM
202
JDBC API
204
JDBC CLASSES
208
DATABASE SPECIFIC DRIVER
210
DATABASE ENGINE API
212
SQL DATABASE ENGINE
214
RELATIONAL DATABASE TABLES
TABLE 1
TABLE 2
TABLE N
216
216A
216B
218
216C
SQL STATEMENT ELEMENT TABLES
TABLE DEFINITION TABLE
1ST FIELD DEFINITION TABLE
2ND FIELD DEFINITION TABLE
NTH FIELD DEFINITION TABLE
220
222A
222B
222C

FIG. 2

EXAMPLE TABLE DEFINITION TABLE

300

EXPANDS 220

| 302 | 304 | 306 | 308 | 310 | 312 |
|---|---|---|---|---|---|
| TARGET TABLENAME UTABLENAME ITABLENAME | QUERY TABLENAME QTABLENAME | QUERY SEARCH CLAUSE QSEARCH | TARGET ACTION ACTION | FIELDDEF TABLENAME FTABLENAME | TABLE SEQ # TABSEQ |
| OPERSTAT | TEMPSTAT | | INSERT | OPERSTATTAB | 1 |
| UNITSTAT | OPERSTAT | | UPDATE/INSERT | UNITSTATTAB | 2 |
| COMPLEXSTAT | UNITSTAT | COMPLEX ID=1 | UPDATE | COMPLEXTAB | 3 |
| COMPLEXSTAT | UNITSTAT | COMPLEX ID=2 | UPDATE | COMPLEXTAB | 3 |

FIG. 3

EXAMPLE FIELD DEFINITION TABLES

FIELD DEFINITION TABLE: OPERSTAT

400 EXPANDS 222A

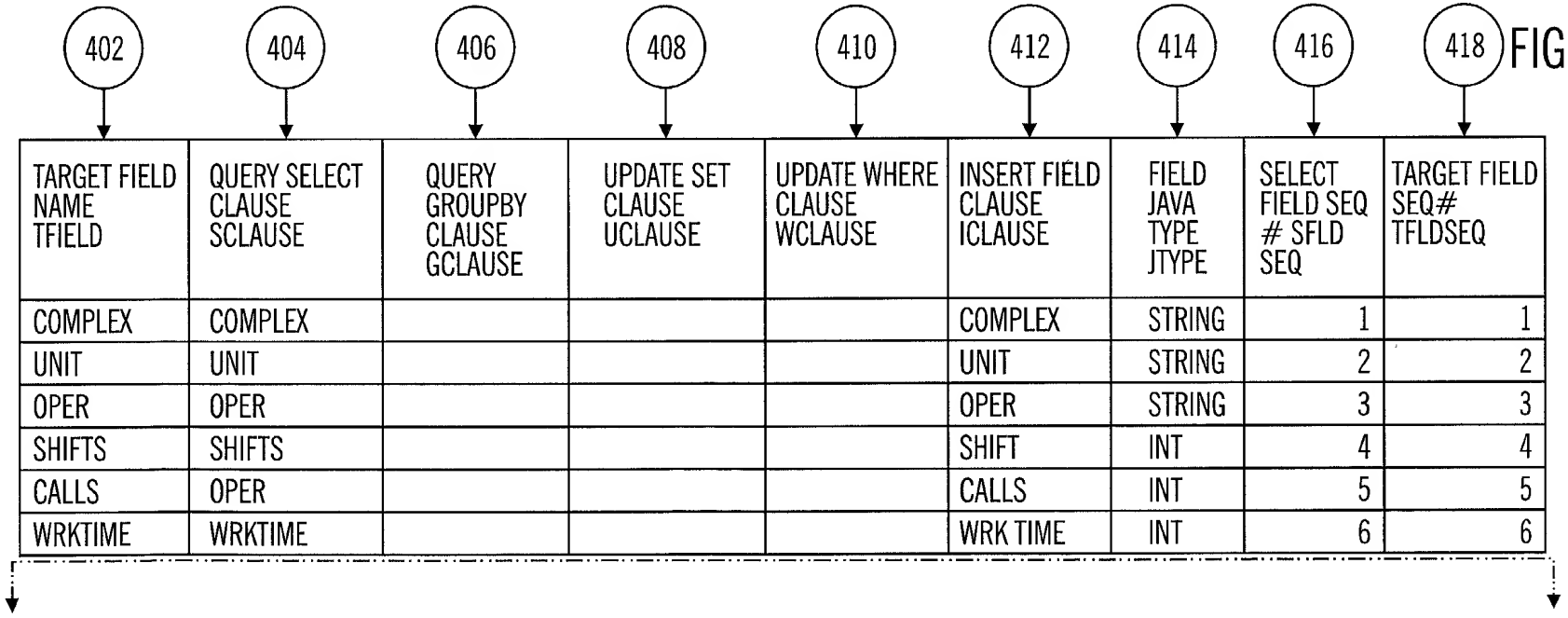



FIG. 4A

| TARGET FIELD NAME TFIELD | QUERY SELECT CLAUSE SCLAUSE | QUERY GROUPBY CLAUSE GCLAUSE | UPDATE SET CLAUSE UCLAUSE | UPDATE WHERE CLAUSE WCLAUSE | INSERT FIELD CLAUSE ICLAUSE | FIELD JAVA TYPE JTYPE | SELECT FIELD SEQ # SFLD SEQ | TARGET FIELD SEQ# TFLDSEQ |
|---|---|---|---|---|---|---|---|---|
| COMPLEX | COMPLEX | | | | COMPLEX | STRING | 1 | 1 |
| UNIT | UNIT | | | | UNIT | STRING | 2 | 2 |
| OPER | OPER | | | | OPER | STRING | 3 | 3 |
| SHIFTS | SHIFTS | | | | SHIFT | INT | 4 | 4 |
| CALLS | OPER | | | | CALLS | INT | 5 | 5 |
| WRKTIME | WRKTIME | | | | WRK TIME | INT | 6 | 6 |

FIELD DEFINITION TABLE: UNITSTATTAB

420 EXPANDS 222B

| 422 TARGET FIELD NAME TFIELD | 424 QUERY SELECT CLAUSE SCLAUSE | 426 QUERY GROUPBY CLAUSE GCLAUSE | 428 UPDATE SET CLAUSE UCLAUSE | 430 UPDATE WHERE CLAUSE WCLAUSE | 432 INSERT FIELD CLAUSE ICLAUSE | 434 FIELD JAVA TYPE JTYPE | 436 SELECT FIELD SEQ # SFLD SEQ | 438 TARGET FIELD SEQ # TFLDSEQ |
|---|---|---|---|---|---|---|---|---|
| COMPLEX | COMPLEX | COMPLEX | | COMPLEX =? | COMPLEX | STRING | 1 | 1 |
| UNIT | UNIT | UNIT | | UNIT =? | UNIT | STRING | 2 | 2 |
| CALLS | SUM(CALLS) | | CALLS =? | | CALLS | INT | 3 | 3 |
| WRK TIME | SUM(WRKTIME) | | WRKTIME =? | | WRKTIME | INT | 4 | 4 |
| CUMCALLS | | | CUMCALLS = CUMCALLS +? | | CUMCALLS | INT | 3 | 5 |
| CUMWRKTIME | | | CUMWRKTIME = CUMWRKTIME +? | | CUMWRKTIME | INT | 4 | 6 |

FIG. 4B

5/19

FIELD DEFINITION TABLE: COMPLEXSTATTAB

440 EXPANDS 222C

| 442 TARGET FIELD NAME TFIELD | 444 QUERY SELECT CLAUSE SCLAUSE | 446 QUERY GROUPBY CLAUSE GCLAUSE | 448 UPDATE SET CLAUSE UCLAUSE | 450 UPDATE WHERE CLAUSE WCLAUSE | 452 INSERT FIELD CLAUSE ICLAUSE | 454 FIELD JAVA TYPE JTYPE | 456 SELECT FIELD SEQ #SFLD SEQ | 458 TARGET FIELD SEQ # TFLDSEQ |
|---|---|---|---|---|---|---|---|---|
| COMPLEX | COMPLEX | | | COMPLEX = ? | | STRING | 1 | 1 |
| CALLS | SUM(CALLS) | | CALLS=CALLS +? | | | INT | 2 | 2 |
| HRSWORK | SUM(WRKTIME) | | HRSWORK=HRSWORK+? | | | INT | 3 | 3 |

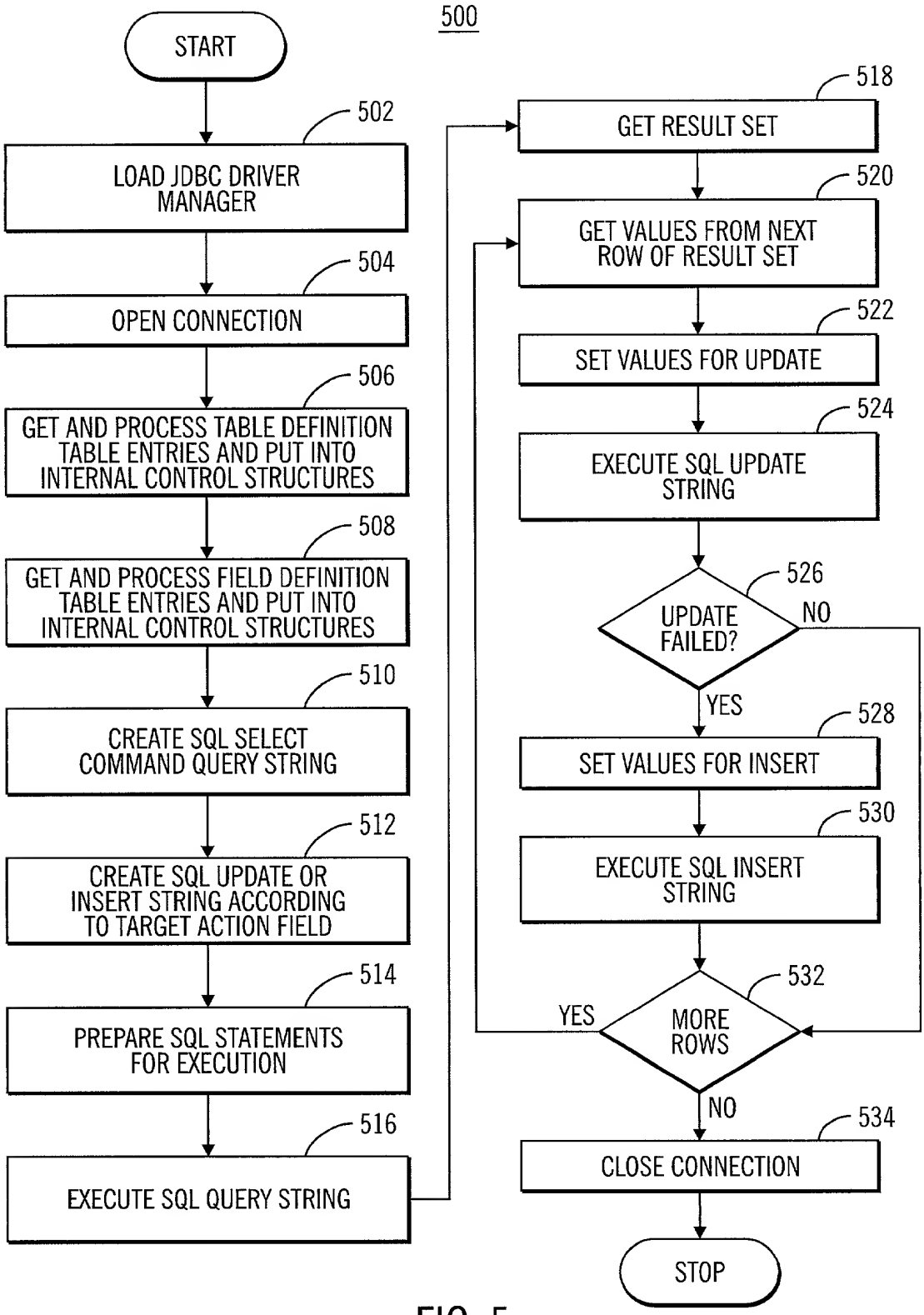

500
START
502
LOAD JDBC DRIVER MANAGER
504
OPEN CONNECTION
506
GET AND PROCESS TABLE DEFINITION TABLE ENTRIES AND PUT INTO INTERNAL CONTROL STRUCTURES
508
GET AND PROCESS FIELD DEFINITION TABLE ENTRIES AND PUT INTO INTERNAL CONTROL STRUCTURES
510
CREATE SQL SELECT COMMAND QUERY STRING
512
CREATE SQL UPDATE OR INSERT STRING ACCORDING TO TARGET ACTION FIELD
514
PREPARE SQL STATEMENTS FOR EXECUTION
516
EXECUTE SQL QUERY STRING
518
GET RESULT SET
520
GET VALUES FROM NEXT ROW OF RESULT SET
522
SET VALUES FOR UPDATE
524
EXECUTE SQL UPDATE STRING
526
UPDATE FAILED?
NO
YES
528
SET VALUES FOR INSERT
530
EXECUTE SQL INSERT STRING
532
MORE ROWS
YES
NO
534
CLOSE CONNECTION
STOP

FIG. 5

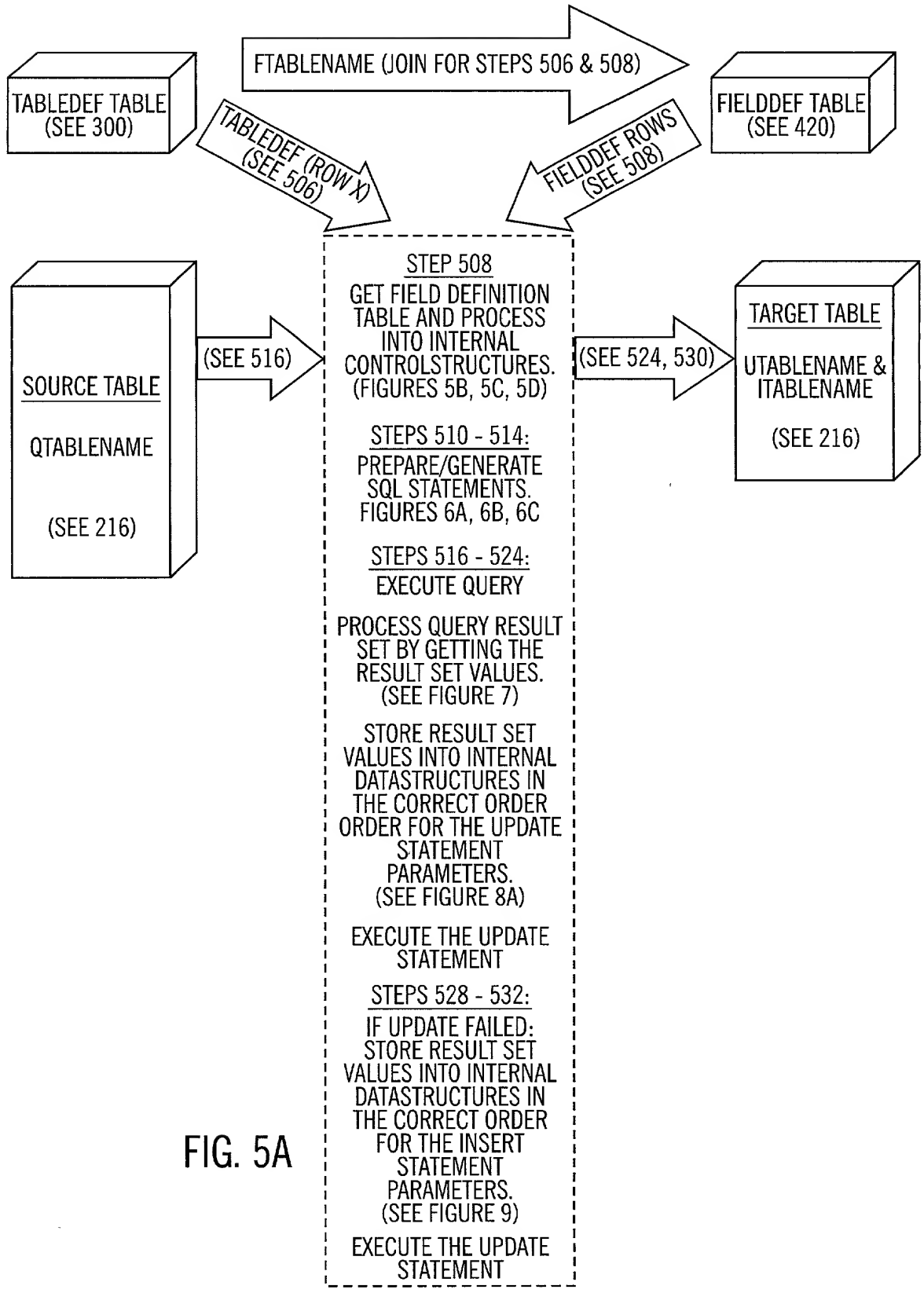

FTABLENAME (JOIN FOR STEPS 506 & 508)
TABLEDEF TABLE (SEE 300)
FIELDDEF TABLE (SEE 420)
TABLEDEF (ROW X) (SEE 506)
FIELDDEF ROWS (SEE 508)
SOURCE TABLE
QTABLENAME
(SEE 216)
(SEE 516)
STEP 508
GET FIELD DEFINITION TABLE AND PROCESS INTO INTERNAL CONTROLSTRUCTURES. (FIGURES 5B, 5C, 5D)
STEPS 510 - 514:
PREPARE/GENERATE SQL STATEMENTS. FIGURES 6A, 6B, 6C
STEPS 516 - 524:
EXECUTE QUERY
PROCESS QUERY RESULT SET BY GETTING THE RESULT SET VALUES. (SEE FIGURE 7)
STORE RESULT SET VALUES INTO INTERNAL DATASTRUCTURES IN THE CORRECT ORDER ORDER FOR THE UPDATE STATEMENT PARAMETERS. (SEE FIGURE 8A)
EXECUTE THE UPDATE STATEMENT
STEPS 528 - 532:
IF UPDATE FAILED: STORE RESULT SET VALUES INTO INTERNAL DATASTRUCTURES IN THE CORRECT ORDER FOR THE INSERT STATEMENT PARAMETERS. (SEE FIGURE 9)
EXECUTE THE UPDATE STATEMENT
(SEE 524, 530)
TARGET TABLE
UTABLENAME & ITABLENAME
(SEE 216)

FIG. 5A

550

```
Select SCLAUSE, JTYPE, SFLDSEQ FROM UnitStatTab WHERE SCLAUSE is
NOT NULL ORDER BY SFLDSEQ

i=1
While not end of resultset
{
// Get values from next row of resultset
 SClause[i] = GetString [1]          // get SCLAUSE
 SJType[i] = GetString [2]           // get JTYPE      551
 SFldSeq[i] = GetInt [3]             // get SFldSeq
i++
}
Ssize = i--:
```

FIG. 5B1

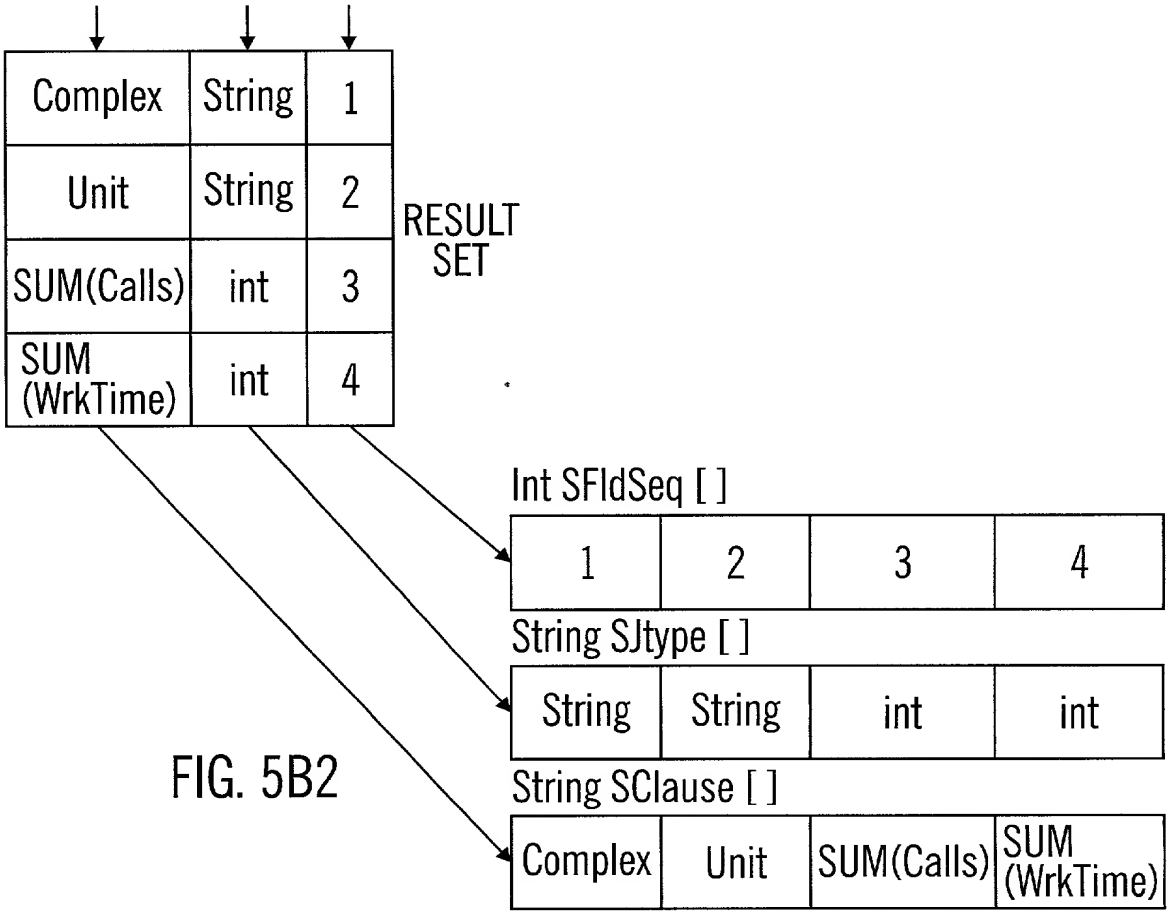



FIG. 5B2

556

```
Select GCLAUSE, SFLDSEQ FROM UnitStatTab WHERE GCLAUSE is
                                NOT NULL ORDER BY SFLDSEQ

i=1
While not end of resultset
{
// Get values from next row of resultset
GClause[i] = GetString [i]          // get GCLAUSE   557
i++
}
Gsize = i--:
```

FIG. 5B3

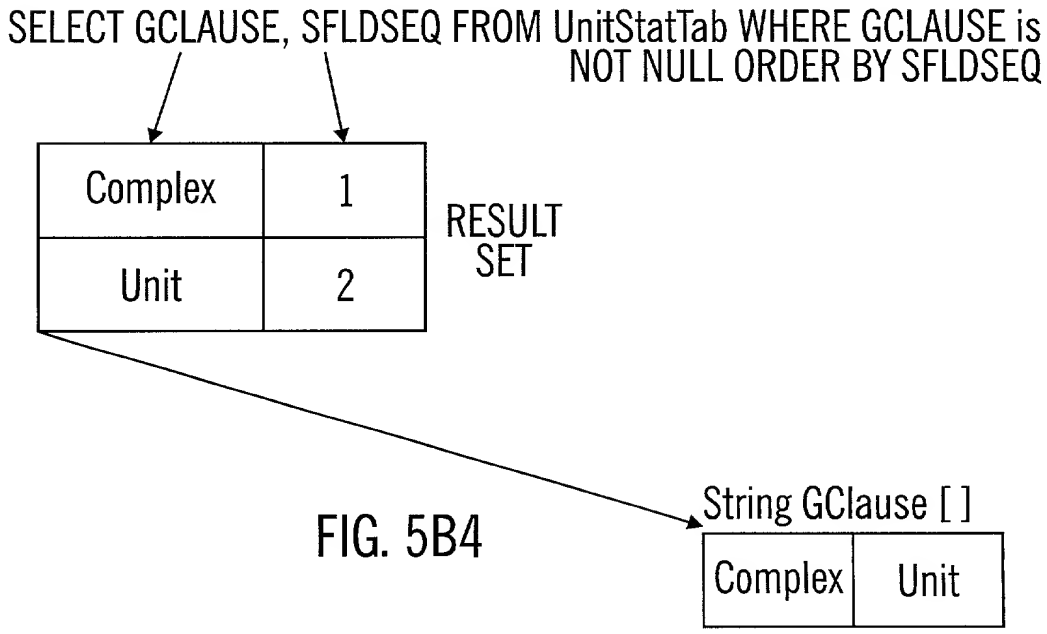



FIG. 5B4

```
                                                        565
SELECT UCLAUSE, JTYPE, SFLDSEQ, TFLDSEQ FROM UnitStatTab WHERE
                                    UCLAUSE is NOT NULL ORDER BY TFLDSEQ
    i=1
    While not end of resultset
    {
    // Get values from next row of resultset
    UClause[i] = GetString [1]          // get UCLAUSE
    UJType[i] = GetString [2]           // get JTYPE        ~ 566
    USFldSeq[i] = GetInt [3]            // get SFldSeq
    UFldseq[i] = i                      // reset sequence
    i++
    }
    Usize = i--:
```

FIG. 5C1

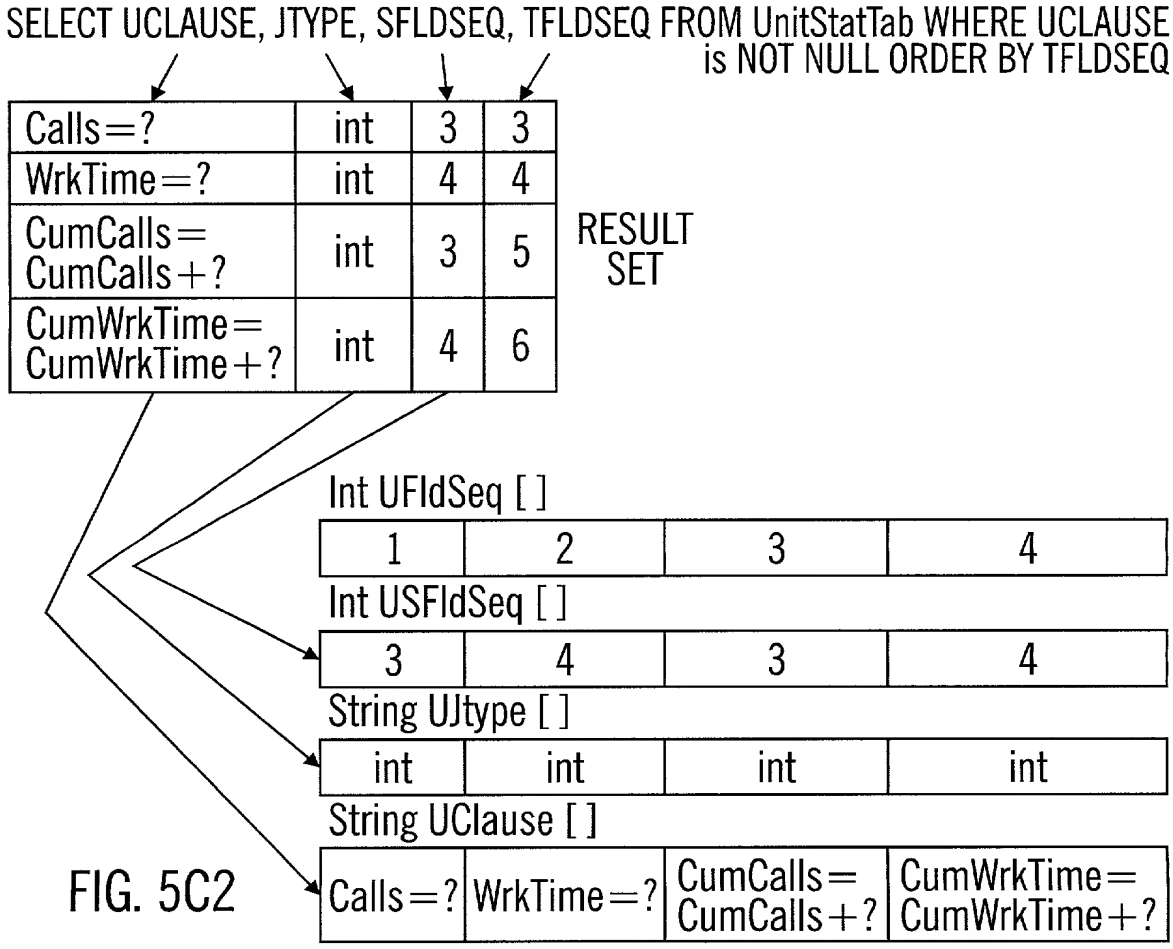



FIG. 5C2

574

```
SELECT WCLAUSE, SFLDSEQ, TFLDSEQ FROM UnitStatTab WHERE
                    WCLAUSE is NOT NULL ORDER BY TFLDSEQ
  i=1
  While not end of resultset
  {
  // Get values from next row of resultset
   WClause[i] = GetString [1]              // get WCLAUSE
   WJType[i] = GetString [2]               // get JTYPE      575
   WSFldSeq[i] = GetInt [3]                // get SFldSeq
   WFldseq[i] = Usize + i                  // reset sequence
   i++
   }
   Wsize = i--:
```

FIG. 5C3

SELECT WCLAUSE, SFLDSEQ, TFLDSEQ FROM UnitStatTab WHERE WCLAUSE is NOT NULL ORDER BY TFLDSEQ

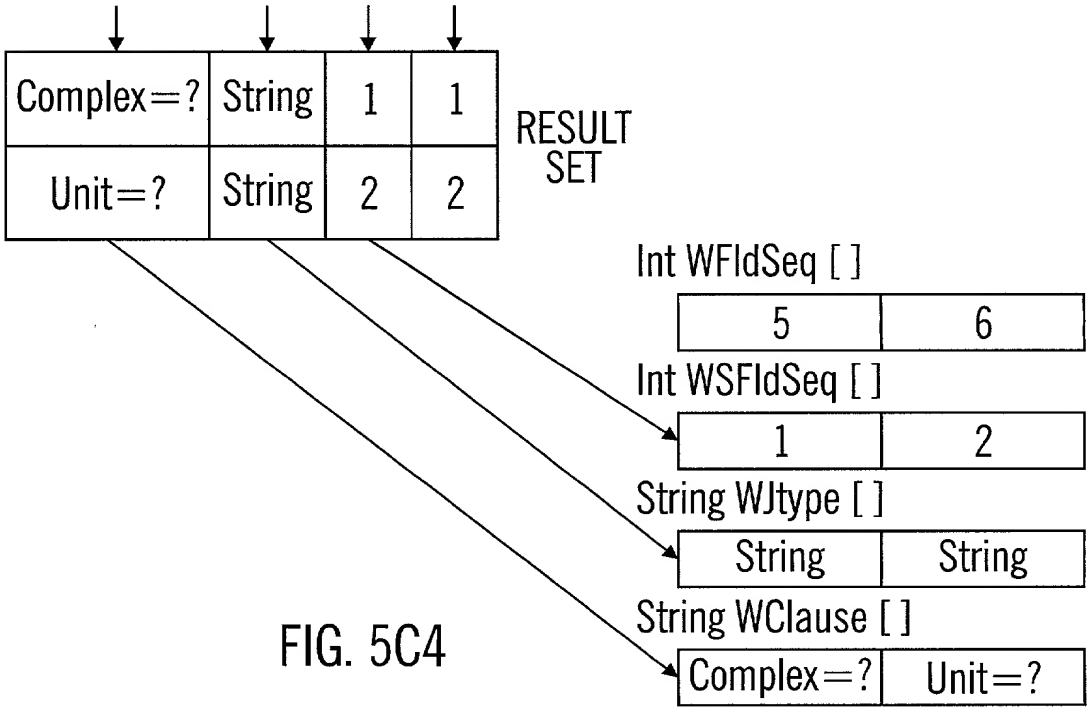



FIG. 5C4

```
                                                              580
SELECT ICLAUSE, JTYPE, SFLDSEQ, TFLDSEQ FROM UnitStatTab WHERE
                                    ICLAUSE is NOT NULL ORDER BY TFLDSEQ
    i=1
    While not end of resultset
    {
    // Get values from next row of resultset
     IClause[i] = GetString [1]          // get ICLAUSE
     IJType[i] = GetString [2]           // get JTYPE        ~ 581
     ISFldSeq[i] = GetInt [3]            // get SFldSeq
     IFldseq[i] = i                      // reset sequence
     i++
     }
     Isize = i--:
```

FIG. 5D1

SELECT ICLAUSE, JTYPE, SFLDSEQ, TFLDSEQ FROM UnitStatTab WHERE ICLAUSE is NOT NULL ORDER BY TFLDSEQ

| | | | |
|---|---|---|---|
| Complex | String | 1 | 1 |
| Unit | String | 2 | 2 |
| Calls | int | 3 | 3 |
| WrkTime | int | 4 | 4 |
| CumCalls | int | 3 | 5 |
| CumWrkTime | int | 4 | 6 |

RESULT SET

Int IFldSeq [ ]

| | | | | | |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |

Int ISFldSeq [ ]

| | | | | | |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 3 | 4 |

String IJtype [ ]

| | | | | | |
|---|---|---|---|---|---|
| String | String | int | int | int | int |

String IClause [ ]

| | | | | | |
|---|---|---|---|---|---|
| Complex | Unit | Calls | WrkTime | CumCalls | CumWrkTime |

FIG. 5D2

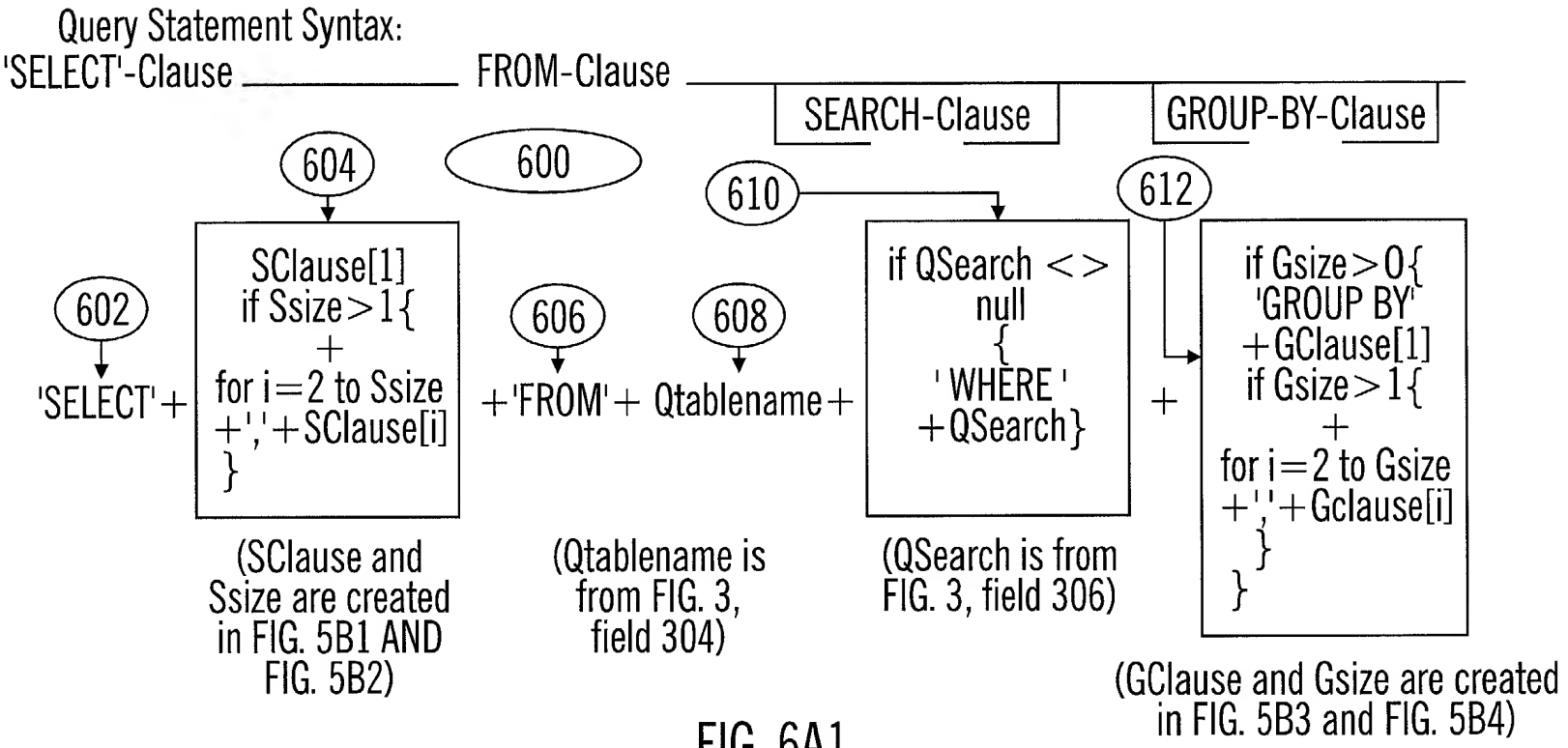



FIG. 6A1

Select Statement String which was built from 600 above.

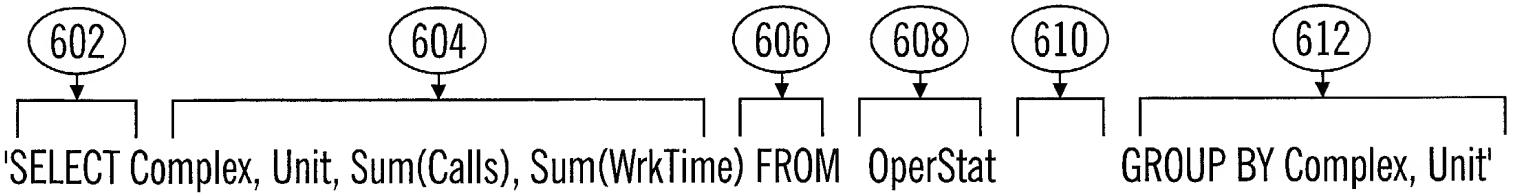



FIG. 6A2

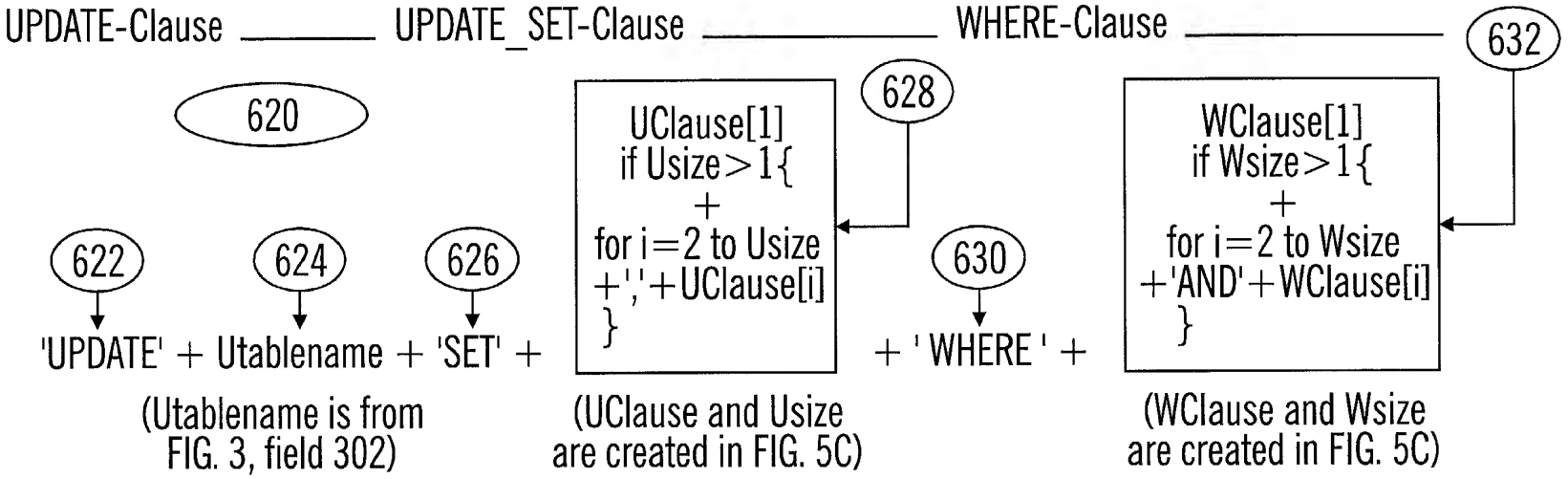



FIG. 6B1

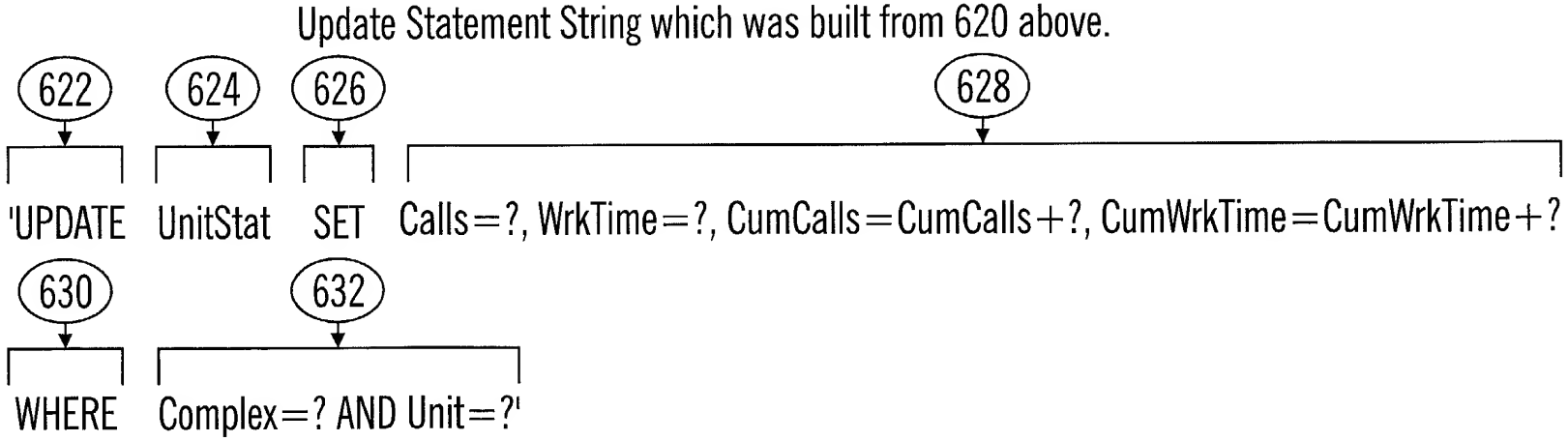



FIG. 6B2

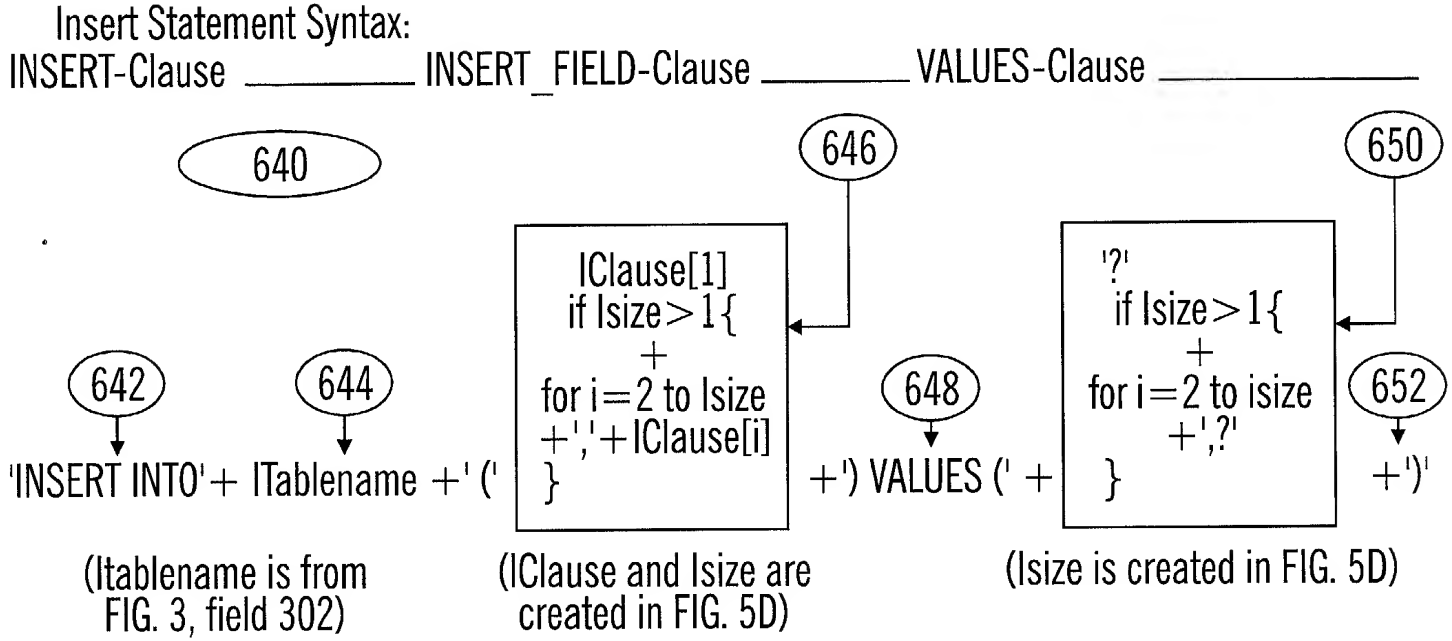



FIG. 6C1

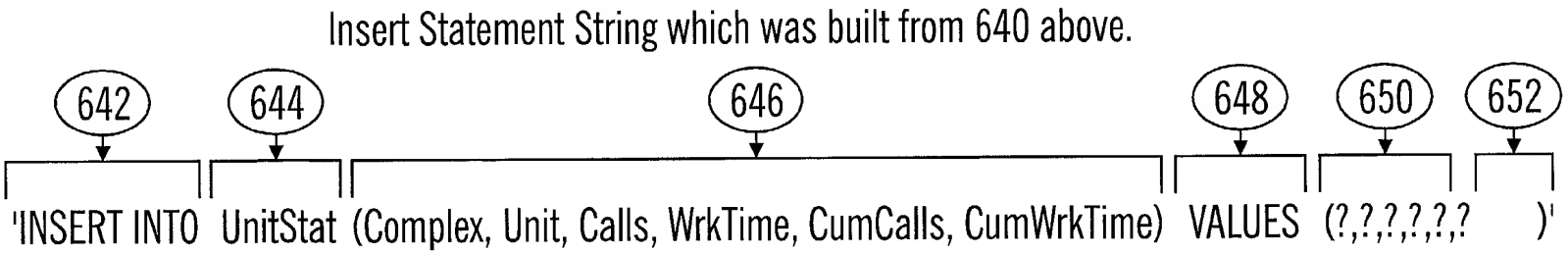



FIG. 6C2

550

```
'SELECT Complex, Unit, Sum(Calls), Sum(WrkTime) FROM OperStat
                                                GROUP BY Complex, Unit'

  For i=1 to Ssize
  {
    j=SFldSeq[i]
    if SJType[i]='String'
      StringRS[j]=GetString[i]
  else
      IntRS[j]=Getint[i]
   }
```

FIG. 7A

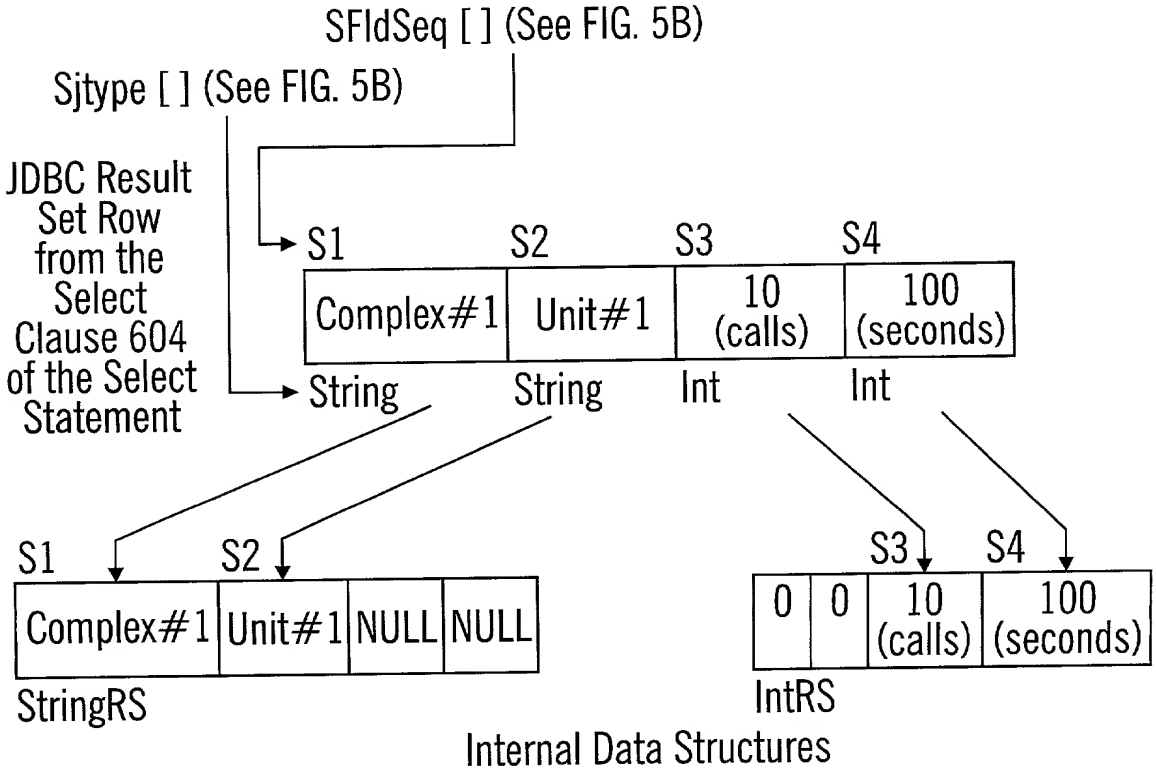



FIG. 7B

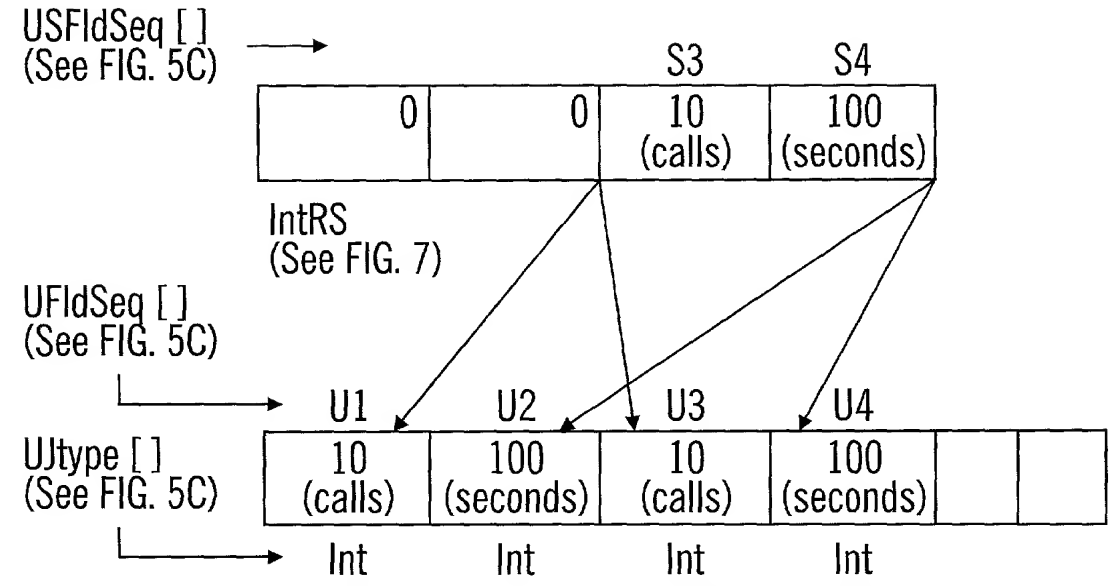
```
'UPDATE UnitStat SET Calls=?, WrkTime=?, CumCalls=CumCalls+?,
                      U1       U2                    U3
                                          CumWrkTime=CumWrkTime+?
                                                          U4
 WHERE Complex=? AND Unit=?'
              U5          U6
```

```
For i=1 to Usize
{
  j=UFldSeq[i]
  k=USFldSeq[i]
  if UJType[i]='String'
    setString[j]=StringRS[k]
  else
    setint[j]=IntRS[k]
 }
```

FIG. 8A1

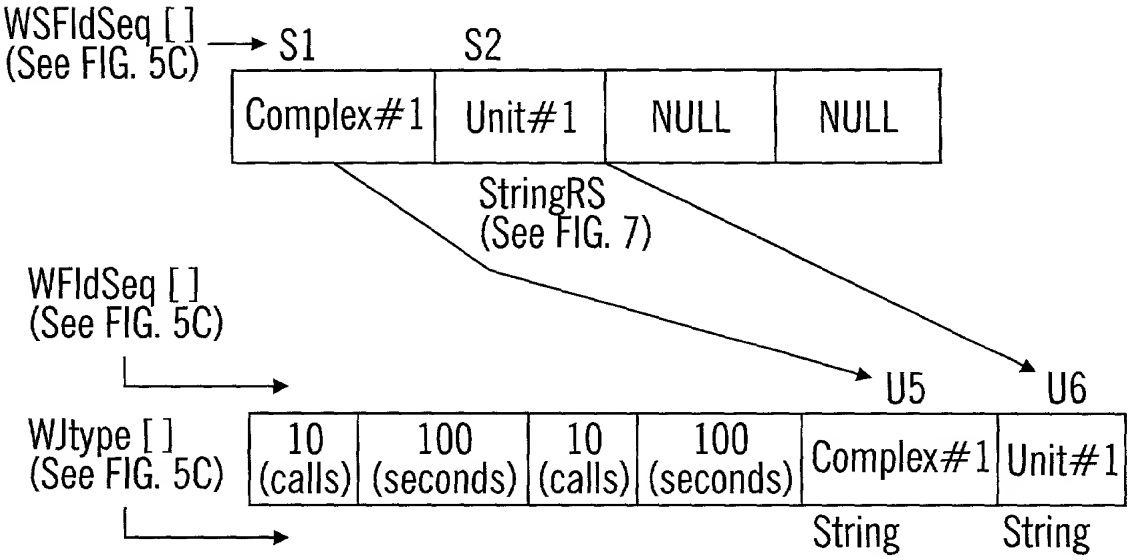
```
For i=1 to Wsize
{
  j=WFldSeq[i]
  k=WSFldSeq[i]
  if WJType[i]='String'
    setString[j]=StringRS[k]
  else
    setint[j]=IntRS[k]
 }
```

FIG. 8A2




JDBC parameters for Update_Set Clause 628 of Update Statement

FIG. 8A3



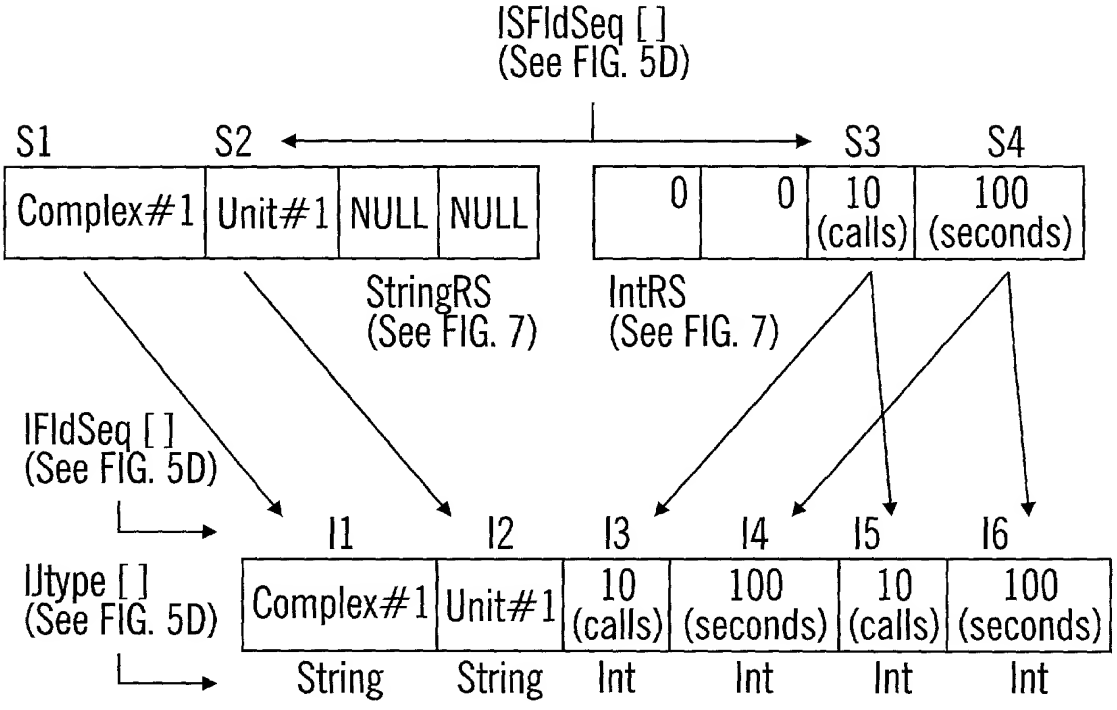

JDBC parameters for Where Clause 632 of Update Statement

FIG. 8A4

```
'INSERT INTO  UnitStat(Complex, Unit, Calls, WrkTime, CumCalls,
CumWrkTime) VALUES (?,?,?,?,?,?)'
                              I1,I2,I3,I4,I5,I6

For i=1 to Isize
{
  j=IFldSeq[i]
  k=ISFldSeq[i]
  if IJType[i]='String'
    setString[j]=StringRS[k]
 else
   setint[j]=IntRS[k]
}
```

FIG. 9A




JDBC parameters for Values Clause 650 of Insert Statement

FIG. 9B